

THAT WHICH IS CLAIMED IS:

1. A method for performing a hearing evaluation test over a computer network, comprising the steps of:

5 administering a hearing evaluation test to a patient using a computer network, the hearing evaluation test comprising a plurality of hearing assessment signals at selected frequencies and hearing levels;

transmitting commands from a test administration site to a local patient testing site during said administering step;

10 generating the hearing assessment signals at the local patient site in response to said transmitting step; and

interactively relaying information between the patient located at the local site and a clinician located at the test administration site during said administering step so that the clinician can evaluate the patient's response to the hearing assessment signals, the test administration site being remote from the local site.

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2. A method according to Claim 1, wherein the computer network is a global computer network.

3. A method according to Claim 1, further comprising the step of  
20 adjusting the output of a hearing assessment signal during said administering step based on the response of the patient.

4. A method according to Claim 1, wherein the hearing evaluation test  
25 assessment signals are sufficient in number and variation of frequency and sound intensity to allow the clinician to perform a diagnostic hearing evaluation.

5. A method according to Claim 4, wherein the auditory tone presentation  
of the hearing assessment signals during said administering step meets ANSI  
standards.

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6. A method according to Claim 5, further comprising the steps of:  
transmitting a command from the test administration site to increase

the sound intensity level of at least one of the plurality of hearing assessment signals relayed to the patient at the local site during said administering step; and

transmitting a command from the test administration site to decrease the sound intensity levels of at least one of the plurality of hearing assessment signals  
5 during said administering step.

7. A method according to Claim 1, wherein said interactively relaying step includes relaying dynamic audiovisual communications of the patient at the local site to the test administration site during said administering step.

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8. A method according to Claim 7, further comprising the step of determining the ambient noise level at the local site prior to said administering step.

9. A method according to Claim 1, further comprising the step of  
15 controlling the sound intensity of the hearing assessment signals delivered to the patient from said test administration site.

10. A method according to Claim 9, wherein the clinician adjusts the sound intensity of a selected frequency of the hearing assessment signals which are  
20 delivered to the patient responsive to the patient's response to a particular hearing assessment signal frequency transmitted thereto.

11. A method according to Claim 1, wherein the hearing evaluation test assessment signals are sufficient to allow the clinician to measure (a) middle ear  
25 pressure and compliance characteristics and (b) acoustics reflexes.

12. A method according to Claim 1, wherein the hearing evaluation test measures at least one of transient and distortion product emission levels in the ear.

13. A method according to Claim 9, further comprising the step of  
30 accepting user input by the patient during said administering test.

14. A method according to Claim 13, wherein said accepting step is carried out by the patient contacting at least one of a switch and a key on a keyboard.

5 15. A method according to Claim 13, wherein said accepting step is carried out by the patient speaking into a microphone.

10 16. A method according to Claim 15, wherein the patient speech input is automatically converted to textual feedback to the clinician via voice recognition software.

17. A method according to Claim 16, wherein said accepting step is carried out by visual feedback to the clinician of the response of the patient during said administering step.

15 18. A method according to Claim 1, wherein the local site is a clinic.

19. A method according to Claim 18, wherein the local site is a pediatrician's office.

20 20. A method according to Claim 1, wherein the local site is an industrial site.

25 21. A method according to Claim 1, further comprising the step of scheduling an appointment time suitable to the patient and the clinician in advance of said administering step.

30 22. A method according to Claim 21, wherein said scheduling step includes obtaining health provider information and assigning a patient identification number.

23. A method according to Claim 22, wherein said scheduling step includes applying for insurance approval.

24. A method according to Claim 23, wherein said scheduling step includes accepting an electronic deposit of money to reserve the desired appointment time.

5 25. A method according to Claim 23, wherein the requested appointment time is confirmed in an electronic message transmitted to the patient based on receipt of insurance provider approval.

10 26. A method according to Claim 1, wherein the hearing assessment signals are carried out at a plurality of frequencies in the range of between about 20-20,000Hz.

15 27. A method according to Claim 26, wherein the hearing assessment signals comprise tones representing both speech and non-speech signals at frequencies in the range of between about 125-12,000Hz.

20 28. A method according to Claim 26, further comprising the step of controlling the tone presentation of the hearing assessment signals such that the harmonic distortion is less than about 1%.

29. A method according to Claim 28, wherein the hearing evaluation conforms to standardized ANSI requirements.

25 30. A method according to Claim 1, wherein said interactive relaying step includes relaying at least one of audio, audiovisual, visual, and text-based interactive messages between the patient and the clinician during said administering step.

30 31. A method for delivering a diagnostic hearing test over a global computer network from a test administration site to a patient site, comprising the steps of:

generating, at a patient site, a plurality of hearing assessment signals at frequencies in the range of about 20-20,000Hz;

transmitting, to the patient, a plurality of hearing assessment signals from said generating step, the plurality of hearing assessment signals being sufficient in number and variation of frequency and sound level intensity to provide enough information to the test administration control site to allow a diagnostic hearing evaluation to be

5 performed by a clinician thereat according to predetermined standards;

controlling the output of the hearing assessment signals which are relayed to the patient during said transmitting step at a local site from a test administration site which is remote from the patient site, wherein said controlling step is carried out such that a clinician at the test administration site determines which hearing assessment  
10 signals of said generating step are relayed locally to the patient,

accepting patient input indicating when each of the plurality of hearing assessment signals from said transmitting step becomes audible thereto during said transmitting step; and

15 diagnosing the hearing ability or hearing loss of the patient at the test administration site away from the patient site.

32. A method according to Claim 31, wherein the hearing assessment signals are carried out at a plurality of frequencies in the range of between about 20-20,000Hz.

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33. A method according to Claim 32, wherein the hearing assessment signals comprise tones representing speech and non-speech signals at at least eight different frequencies in the range of between about 125-12,000Hz.

25 34. A method according to Claim 32, further comprising the step of controlling the tone presentation of the hearing assessment signals such that the harmonic distortion is less than about 1%.

35. A method according to Claim 31, wherein the diagnostic hearing test  
30 conforms to standardized ANSI requirements.

36. A method according to Claim 31, further comprising assessing acoustic reflexes, and middle ear pressure and compliance characteristics.

37. A method according to Claim 29, further comprising evaluating distortion product emission levels in the ear.

38. A method of controlling a diagnostic hearing test, the method  
5 comprising the steps of:  
serving web pages from a web server associated with a diagnostic hearing test device to a web client which indicate a status of the diagnostic hearing test;  
receiving requests from the web client which provide parameters for performing the diagnostic hearing test; and  
10 controlling operation of the diagnostic test device based on the parameters of the received request from the web client so as to provide control of the diagnostic hearing test.

39. A method according to Claim 38, wherein the requests from the web  
15 client are common gateway interface (CGI) requests which specify parameters for performing the diagnostic tests.

40. A method according to Claim 38, further comprising the step of  
20 automatically periodically requesting web pages from the server so as to periodically update the status of the diagnostic hearing test.

41. A method according to Claim 38, further comprising the step of  
25 downloading to the web client an applet which periodically reloads a current web page of the web client so as to periodically update the status of the diagnostic hearing test.

42. A method according to Claim 41, wherein a frequency with which the applet reloads the current web page is based on the current web page.

43. A method according to Claim 42, wherein the step of downloading is  
30 carried out for each initial serving of a web page to a client.

44. A method according to Claim 38, wherein the diagnostic hearing test comprises measuring middle ear pressure and compliance characteristics.

45. A method according to Claim 38, wherein the hearing evaluation test  
5 comprises measuring transient and/or distortion product emission levels in the ear.

46. A hearing evaluation device, comprising:  
a web server;  
a diagnostic test device operably associated with the web server and  
10 configured so as to be controlled by the web server; and  
wherein the web server is further configured to serve web pages to a web client which indicate a status of a diagnostic hearing test, receive requests from the web client which provide parameters for performing the diagnostic hearing test, and control operation of the diagnostic test device based on the parameters of the received  
15 request from the web client.

47. A hearing evaluation device for generating hearing assessment signals at a local patient site, comprising:  
a processor configured to communicate over a computer network;  
20 a tone generator operably associated with the processor, wherein, in operation, said tone generator is configured to generate tones at a plurality of selected frequencies in the frequency range of between about 20-20,000Hz;  
an output device operably associated with the tone generator, wherein, in operation, said output device adapted to deliver the tones of the hearing assessment  
25 signals to a patient undergoing a hearing evaluation; and  
an input device operably associated with the processor, said input device configured to indicate a patient's response to each of the tones of the hearing assessment signals;  
wherein the hearing evaluation device is configured to receive commands  
30 from a remote site through said processor computer network to select or adjust the tones generated by the tone generator.

48. A hearing evaluation device according to Claim 47, further comprising:

a microphone configured to detect ambient noise; and  
an audio analyzer in electrical communication with the microphone for  
5 measuring the sound level detected by the microphone.

49. A device according to Claim 48, wherein the device is configured to operate independently of a local computer.

10 50. A method of controlling a hearing test, the method comprising the steps of:

serving web pages from a web server associated with a hearing test device to a web client which indicate a status of the hearing test;

receiving requests from the web client which provide parameters for  
15 performing the hearing test; and

controlling operation of the hearing test device based on the parameters of the received request from the web client so as to provide control of the hearing test.

51. A method according to Claim 50, wherein the hearing test comprises  
20 obtaining a biotelemetry measurement of the ear of the subject for evaluating at least one of middle ear pressure and compliance characteristics or transient and/or distortion product emission levels in the ear.

52. A method according to Claim 50, wherein the hearing test comprises a  
25 diagnostic hearing test of selected tones.

53. A method according to Claim 52, wherein the requests from the web client are common gateway interface (CGI) requests which specify parameters for performing the diagnostic hearing test.

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54. A method according to Claim 50, further comprising the step of automatically periodically requesting web pages from the server so as to periodically update the status of the hearing test.



55. A method for performing a hearing evaluation test over a computer network, comprising the steps of:

obtaining at least one of a tympanometric measurement of middle ear pressure and compliance or the measurement of evoked otoacoustic emissions of a patient

5 using a computer network;

transmitting commands from a test administration site to a local patient testing site during at least a portion of said obtaining step;

generating the hearing assessment signals at the local patient site in response to said transmitting step; and

10 relaying data between the local site to a clinician located at the test administration site during at least a portion of said obtaining step so that the clinician can evaluate the patient's response to the hearing assessment signals, the test administration site being remote from the local site.

15 56. A method of controlling a electrophysiological auditory evaluation test using one or more of otoacoustic emissions and tympanometry, the method comprising the steps of:

serving web pages from a web server associated with an otoacoustic auditory evaluation test device configured to measure otoacoustic emissions including at least  
20 one of middle ear compliance and cochlear hair cell responses, to a web client which indicates a status of the otoacoustic evaluation test;

receiving requests from the web client which provide parameters for performing the otoacoustic evaluation test; and

controlling at least a portion of the operation of the test based on the  
25 parameters of the received request from the web client.

57. A hearing evaluation device, comprising:

a web server;

a diagnostic test device operably associated with the web server and

30 configured so as to be controlled by the web server; and

wherein the web server is further configured to host socket connections to a web client that provide data that indicates a status of a diagnostic hearing test, receive requests from the web client that provides parameters for performing the diagnostic

hearing test, and control operation of the diagnostic test device based on the parameters of the received request from the web client.

58. A method of controlling a diagnostic hearing test, the method  
5 comprising the steps of:  
hosting a socket connection at a web server for the transfer of data associated  
with a diagnostic hearing test device to a client which indicates a status of the  
diagnostic hearing test;  
establishing test parameters of the hearing test device over the hosted socket  
10 connection;  
controlling operation of the diagnostic test device over the hosted socket  
connection based on the parameters received from the client over the hosted socket  
connection so as to provide control of the diagnostic hearing test;  
receiving results associated with the diagnostic hearing test at the client over  
15 the hosted connection; and  
wherein the steps of establishing, controlling and receiving are carried out so  
as to in sufficient number and variation of frequency and sound level intensity to  
provide enough information to the client to allow a diagnostic hearing evaluation to  
be performed by a clinician according to predetermined standards.

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59. The method according to Claim 58, further comprising:  
pinging the web server to determine if the web server is available; and  
requesting status of the diagnostic hearing test device from the web server if  
pinging the web server indicates that the web server is available.